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## LOAD CLAMPING PLATE

### BACKGROUND:

This invention is in the field of industrial lift trucks which employ oppositely disposed load-clamping plates actuated toward and away from each other to clamp a load therebetween for lifting and transporting the load. When the load is transported to the location desired, the load clamping plates are moved away from one another to release the load.

### BRIEF DESCRIPTION OF THE DRAWINGS:

Figure 1 is a front perspective view illustrating an embodiment of the invention as used on an industrial lift truck;

Figure 2 is a partially exploded perspective view of the embodiment shown in Figure 1;

Figure 3 is a detailed end view of the portion encircled as 3 in Figure 2;

Figure 4 is an exploded view of a portion of the embodiment of Figures 1 and 2, illustrating details thereof;

Figure 5 is a partial cross-sectional view of the assembly of the portion of the embodiment shown in Figure 4;

Figure 6 is a top view of the portion of the embodiment shown in detail in Figures 4 and 5;

Figure 7 is a front view of the portion shown in Figure 6; and

Figure 8 is a cross-sectional view taken along the line 8-8 of Figure 6.

DETAILED DESCRIPTION:

Reference now should be made to the drawings, in which the same reference numbers designate the same or similar components throughout the different figures. As illustrated generally in Figure 1, an embodiment of the invention is shown as used in conjunction with an industrial lift truck.

The lift truck 10 shown in Figure 1 is designed to move a pair of oppositely disposed load clamping plates, including main plates 16 and 18, laterally toward and away from one another on mechanism 14, generally illustrated in Figure 1, and vertically on additional mechanism 12, as shown in Figure 1. The details of operating the assembly shown in Figure 1 to effect the movement of the mechanisms 12 and 14 are not provided here, since those mechanisms are well known and are widely used in conjunction with industrial lift truck machines. In addition, the plates 16 and 18, employed with the lift truck 10 shown in Figure 1, are of the size typically used with such industrial lift trucks, generally on the order of 4' by 4', or 4' by 3'. Some specialized applications may be significantly smaller or larger.

In operation, the plates 16 and 18 are moved adjacent the opposite sides of a stack of cartons or similar load (not shown), and then are moved toward one another to squeeze the stack of cartons to thereby allow the carton stack to be lifted by the mechanism 12. The carton stack then may be transported to a desired location. The mechanism 12 then is operated to either

1 raise or lower the stack of cartons to a desired position.  
2 Finally, the plates 16 and 18 are moved away from one another  
3 laterally to allow the stack of cartons to be placed in a warehouse  
4 or truck, or other desired location.

5 In the embodiment shown in Figures 1 through 8, the facing  
6 surfaces of the main plate members 16 and 18 have yieldable  
7 friction material 20 bonded or attached to them. This material 20  
8 may be rubber or rubber-like material having raised portions 20A  
9 separated by parallel grooves 20B extending from front to back, as  
10 illustrated most clearly in Figure 4.

11 Rubber facings or other frictional rubber-like materials have  
12 been used to coat the facing surfaces of main plate members, such  
13 as the members 16 and 18 in the past. Typically, however, these  
14 surfaces undergo significant wear of the rubber coating along the  
15 lower front edge, and extending a substantial distance upward  
16 toward the upper edge of the main plates. If a significant  
17 exposure of the surface of the coated plate (which typically is  
18 made of aluminum) occurs, the slippage of a load which is squeezed  
19 between the plates frequently takes place. This is dangerous, and  
20 in the past the entire clamping pad assembly (including the large  
21 aluminum plates and the rubber coated surfaces) were replaced.  
22 Prior to replacement, it has been the practice in some environments  
23 to turn the clamping plates upside down; so that the upper edge now  
24 becomes the lower edge; and vice versa. When the significant wear  
25 once again occurs on the lower edge, the plates then typically have  
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1 been discarded and replaced with new ones.

2 In the embodiment shown in Figures 1 through 8, the assembly  
3 described in the previous paragraph has been modified by attaching  
4 a separate, elongated, rectangular auxiliary plate 22 (most clearly  
5 shown in Figure 2) to the main plate 16 or 18. The lower edge of  
6 the plate 22 is parallel to the lower edge of the main plate 16 or  
7 18, and the rear edge terminates in the plane of the rear edge of  
8 the main plate 16 or 18.

9 The front or forward edge of the auxiliary plate 22 terminates  
10 a slight distance toward the rear of the front edge of the main  
11 plate 16 or 18, as shown most clearly in Figure 5. In the space  
12 between the front edge of the auxiliary plate 22 and the front edge  
13 of the main plate 16 or 18, a nose piece or shoe 26, having a  
14 beveled front edge (again as shown most clearly in Figures 4 and  
15 5), is attached. As shown in Figure 5, this attachment of the  
16 nose piece 26 is effected through recessed holes 38 by means of  
17 bolts 36, which engage tapped holes 40 (or recessed nuts secured  
18 into the exposed or outer surface of the plates 18 or 16) to firmly  
19 hold the nose piece or shoe 26 in place on the surface 23 of the  
20 plate 16 or 18 adjacent the front edge of the auxiliary plate 22.  
21 This assembly is shown most clearly in Figures 4 and 5, with Figure  
22 5 illustrating the details of the manner of this attachment.

23 It should be noted that the bolts 36 through the nose piece 26  
24 do not extend through the exposed surface of the main plate 16 or  
25 18; and the head of the bolts 36 are below the exposed surface of  
26

1 the nose piece 26 in the recesses 38, as shown most clearly in  
2 Figure 5. It also should be noted that the nose piece 26 is  
3 tapered from the front edge outwardly to the upper surface, again  
4 as shown most clearly in Figures 4,5 and 8. As shown in Figures 5  
5 and 8, the manner in which the nose piece fits over the front edge  
6 of the auxiliary plate 22 is by means of a recess 29 having a  
7 thickness equal to the thickness of the plate 22.

8 The remainder of the surfaces of the main plate members 16 and  
9 18 and the surface of the auxiliary plate 22, located to the rear  
10 of the nose piece 26, are coated with yieldable friction material  
11 20, preferably (but not necessarily) in the form of rubber or  
12 rubber-like material having resilient compressible characteristics.  
13 In order to improve the resiliency and to prevent compression from  
14 hardening the yieldable material, the rubber or rubber-like  
15 material is provided with elongated parallel grooves 20B extending  
16 from the front to the back, or from the front edge to the rear  
17 edge, of the main plate member 16 or 18 and the corresponding  
18 auxiliary plate 22, as illustrated in detail in Figure 4 and in  
19 enlarged detail in Figure 3.

20 The grooves or channels 20B are located between upper surfaces  
21 20A as shown most clearly in Figure 8. Consequently, when pressure  
22 is applied through a squeezing action of the movement of the plates  
23 16 and 18 toward one another to engage a load, the material 20A is  
24 compressed and is permitted to expand into the area of the grooves  
25 20B in the relaxed or uncompressed condition shown in Figure 3.  
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1 This permits substantial resiliency; and once the load is released,  
2 the material is selected to rebound to the original configuration  
3 shown in Figure 3. In place of elongated grooves 20B, circular  
4 depressions or cylindrical columns could also be used, as well as  
5 other configurations.

6 As illustrated in Figure 5, the vertical thickness of the  
7 rubberized material 20A is selected to be slightly above the upper  
8 plane of the nose piece 26. Consequently, upon engagement of the  
9 clamping plates 16 and 18 with a load, the rubber or rubber-like  
10 material 20 which covers the auxiliary plate 22 is compressed along  
11 with compression of the material 20 which overlies or covers the  
12 remainder of the facing surfaces of the main plate members 16 and  
13 18.

14 Typically, the main plate members 16 and 18 have a thickness  
15 on the order of 3/8" or greater; and the backing plate 22 has a  
16 thickness of approximately 1/4" or greater, with a vertical height  
17 or width of approximately 8". This dimension is by way of example  
18 and it may vary to be more or less than 8". The material 20 then  
19 has a thickness of the portion 20A which is greater than 1/4" and  
20 may extend to a thickness of 1 1/4". For example, a thickness of  
21 5/8" over the exposed facing surfaces of either of the plates 16 or  
22 18, and with a thickness of 3/8" or greater over the surface of the  
23 auxiliary plate 22 has been found suitable. The overall thickness  
24 of the rubber or rubber-like coating 20 is selected so that the  
25 plane of the upper surfaces of the portions 20A, which overlies the  
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1 auxiliary plate 22 as well as the remainder of the surface of the  
2 main backing 16 and 18, is all in the same plane.

3 By providing the auxiliary plate 22 with a separate rubberized  
4 coating from the coating which covers the major portion of the  
5 remainder of the main plate members 16 and 18, any excessive wear  
6 which occurs, as mentioned above, typically on the lower edge of  
7 such plates, will occur on the rubberized portion overlying the  
8 auxiliary plate 22. If excessive wear should occur in this region,  
9 bolts 30 which extend through recessed holes 32 in the plate 22 (to  
10 removably secure the plate 22 to the main plate members 16 or 18),  
11 may be removed; and the plate 22, with the rubberized coating 20 on  
12 it, is removed and replaced with a new coated auxiliary plate 22.  
13 This auxiliary plate 22 is a relatively small portion of the mass  
14 of the overall assembly, and yet this is the region where wear most  
15 frequently has occurred in the past. Consequently, by replacing  
16 only this portion of the entire assembly, the composite assembly  
17 enjoys a significantly extended life. In addition, the utilization  
18 of the nose piece 26 reduces wear which, in the past, has occurred  
19 at the lower facing corners of clamping plates like the plates 16  
20 and 18 of such assemblies. If the nose piece 26 should somehow  
21 itself become damaged, it is readily replaced by removing the bolts  
22 36 shown in Figures 4 and 5, and then reassembling a new nose piece  
23 26 with the bolts 36 in the manner described above.

24 The foregoing description of embodiments of the invention is  
25 to be considered as illustrative and not as limiting. Various  
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1 changes and modifications will occur to those skilled in the art  
2 for performing substantially the same function, in substantially  
3 the same way, to achieve substantially the same results without  
4 departing from the true scope of the invention as defined in the  
5 appended claims.  
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